LIGHT-EMITTING DIODE (LED) PACKAGE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from Korean Patent Application No. 10-2015-0108148, filed on Jul. 30, 2015 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference.

BACKGROUND

[0002] The exemplary embodiments disclosed herein relate to a light source package, and more particularly, to a light-emitting diode (LED) package.

[0003] Light-emitting diode (LED) packages are widely used as light source packages due to various advantages such as low power consumption and high luminance. LED packages should to be manufactured to have excellent reliability with regard to wetting, tolerance, and strength. Also, it may be necessary for the LED packages to have improved light extraction efficiency in order to realize high luminance.

SUMMARY

[0004] One or more exemplary embodiments provide a light-emitting diode (LED) package having excellent reliability with regard to wetting, tolerance, and strength, and improved light extraction efficiency.

[0005] According to an aspect of an exemplary embodiment, there is provided a light-emitting diode (LED) package including: a light-emitting structure including a first conductive-type semiconductor layer, an active layer provided on the first conductive-type semiconductor layer, and a second conductive-type semiconductor layer provided on the active layer; an isolating insulation layer provided on two side portions of the light-emitting structure and an upper portion of the light-emitting structure, the upper portion connecting the two side portions; a first connection electrode portion electrically connected to the first conductive-type semiconductor layer; a second connection electrode portion electrically connected to the second conductive-type semiconductor layer; a first electrode pad electrically connected to the first connection electrode portion; a second electrode pad electrically connected to the second connection electrode portion; a first molding resin layer provided between the first electrode pad and the second electrode pad; a first pillar electrode electrically connected to the first electrode pad; a second pillar electrode electrically connected to the second electrode pad; and a second molding resin layer provided on the first molding resin layer, the first electrode pad, and the second electrode pad, and between the first pillar electrode and the second pillar electrode.

[0006] The first molding resin layer may include a material layer which has a reflectivity that is higher than a reflectivity of the second molding resin layer, and the second molding resin layer may include a material layer which has a reliability that is higher than a reliability of the first molding resin layer.

[0007] The first molding resin layer may be an encapsulation layer sealing a gap between the first electrode pad and the second electrode pad.

[0008] The LED package may further include a first reflective layer provided on the first molding resin layer.

[0009] The LED package may further include a second reflective layer provided between the first molding resin layer and the second molding resin layer.

[0010] The first molding resin layer may contact a surface and a side wall of the first electrode pad, a surface and a sidewall of the second electrode pad, a side wall of the first pillar electrode, and a sidewall of the second pillar electrode, and the second molding resin layer may contact the first molding resin layer.

[0011] The second molding resin layer may be an encapsulation layer sealing a gap between the first pillar electrode and the second pillar electrode.

[0012] The light-emitting structure may be a mesa-type light-emitting structure, the isolating insulation layer may insulate the mesa-type light-emitting structure, the first connection electrode portion may include a pole electrode layer penetrating the isolating insulation layer, and the light-emitting structure further may further include a first contact layer provided on the first conductive-type semiconductor layer under the pole electrode layer.

[0013] The light-emitting structure may be a mesa-type light-emitting structure, the isolating insulation layer may insulate the mesa-type light-emitting structure, the second connection electrode portion may include a plate electrode layer, and the plate electrode layer may be provided in the isolating insulation layer, and the light-emitting structure may further include a second contact layer provided on the second conductive-type semiconductor layer under the plate electrode layer.

[0014] The first electrode pad and the second electrode pad may be provided on the isolating insulation layer on the upper portion and the two side portions of the light-emitting structure.

[0015] According to an aspect of another exemplary embodiment, there is provided a light-emitting diode (LED) package including: a first pad area including: a first portion of a light-emitting structure including a first conductive-type semiconductor layer, an active layer, and a second conductive-type semiconductor layer, and a first electrode pad electrically connected to the first conductive-type semiconductor layer; a second pad area including: a second portion of the light-emitting structure, and a second electrode pad electrically connected to the second conductive-type semiconductor layer; a pad isolating area which includes a first molding resin layer and electrically isolates the first pad area and the second pad area from each other; a first pillar electrode formed on the first electrode pad in the first pad area and a second pillar electrode provided on the second electrode pad in the second pad area; and a second molding resin layer provided between the first pillar electrode in the first pad area and the second pillar electrode in the second pad area, and on the pad isolating area.

[0016] The first molding resin layer may include a material layer which has a reflectivity that is higher than a reflectivity of the second molding resin layer, and the second molding resin layer may include a material layer which has a reliability that is higher than a reliability of the first molding resin layer.

[0017] The LED package may further include a first reflective layer provided on the first molding resin layer in the pad isolating area.

[0018] The first molding resin layer may contact a surface of the first electrode pad, a surface of the second electrode pad, a side wall of the first pillar electrode, and a side wall